Laser Doppler flowmetry in healthy rats: impact of isoflurane anesthetic on signal complexity

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Résumé en anglais	Laser Doppler flowmetry (LDF) technique is an optical tool used in clinical investigations to monitor microvascular blood flow. Recent preliminary works have shown that LDF signals recorded in young healthy human subjects are weakly multifractal. Such an information is important as it could lead to a better knowledge of the underlying optical processes giving rise to the signals. In the present work, our goal is to analyze the behavior of LDF signals in anesthesia conditions. For this purpose, we herein study the possible modifications brought by isoflurane, an anesthetic commonly used in clinical practice, on the complexity of LDF signals. In order to conduct our work, twenty LDF signals from anesthetized healthy rats are processed. Anesthesia is performed by using doses of isoflurane varying between 1.5% and 3%, which leads to very light and very deep anesthesia, respectively. The signal processing approach is carried out with two different methods, a parametric generalized quadratic variation based estimation method and a Hurst rescaled range analysis. The results show that extreme doses of isoflurane lead to no distinguishable modification on the characterization of LDF signals based on the two above approaches. These findings infer that, if isoflurane changes the microvascular tissue optical properties, these modifications have no influence on LDF signals complexity measured by the two signal processing approaches used herein.
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